REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

No claims are cancelled, amended or added. Claims 1-13 and 15-17 are now pending in this application.

Claims 1-13 and 15-17 are rejected under §103(a) as being obvious over WO 97/26214. This rejection is respectfully traversed.

I. Prior Art Does Not Teach Grinding a Metal Hydride

Claim 1 of the present application recites subjecting magnesium or a magnesium-based compound known to absorb hydrogen, to a hydrogenation in order to obtain a hydride in the form of a powder, mixing the so-obtained hydride in a powder form with the other element(s) or compound(s) or with a hydride of said other element(s) or compound(s) to obtain a mixture, and subjecting the so-obtained mixture (i.e., the mixture containing the hydride) to an intensive mechanical grinding in order to obtain a composite of nanocrystalline structure in the form of a hydride.

In other words, claim 1 of the present application recites that the starting material is a metal which is subject to hydrogenation which results in a metal hydride (i.e., a metal-hydrogen compound). The metal hydride is then ground into the claimed nanocrystalline metal hydride structure.

In contrast, WO '214 discloses that the starting material is a metal. This metal is then ground into a nanocrystalline powder. Thus, WO '214 does not teach or suggest grinding a metal hydride into a nanocrystalline structure or powder, as recited in claim 1 of the present application.

The Office Action on page 3, last full paragraph, rejects the above argument and refers to page 7, line 2 to page 8, line 20 of WO '214 indicating that "prepared metal hydrides are used to form nanocrystalline composite".

Applicants respectfully disagree. Page 7, line 2 to page 8, line 20 of WO '214 do <u>not</u> teach grinding a metal <u>hydride</u> (i.e., a hydrogenated metal), as recited in claim 1 of the present application.

It is noted that WO '214 defines the term "metal hydride" as a hydrogen carrier <u>metal</u> which has a high hydrogen storage capacity (page 6, lines 5-13). The examples of the metal "hydride" on page 6, lines 14-23 are all metals or metal alloys which have a high hydrogen storage capacity. However, <u>the "metal hydrides" as defined on page 6 WO '214 are not metal-hydrogen compounds</u>.

On page 7, lines 2 to page 8 lines 20, WO '214 teaches an example where a Mg-Ni nanocrystalline alloy (Mg_2Ni) is first formed by milling pure Mg and Ni metal for 20 hours (page 7, line 2 to line 23). A catalyst can be added to this alloy by further grinding with palladium (page 7, line 24 to page 8, line 1). Thus, a metal alloy, not a metal-hydrogen alloy, is subjected to grinding in the method on pages 7-8 of WO '214.

This nanocrystalline Mg_2Ni (which is a high temperature metal hydride <u>forming</u> alloy, <u>not a metal hydride alloy</u>) is then combined with a low temperature metal hydride <u>forming</u> alloy, such as $LaNi_5$, to form the nanocrystalline composite (page 8, line 4) by compressing the two components together in such a way that they are in direct contact with each other to form Mg_2Ni – $LaNi_5$ (page 8, line 20).

Applicants note that Page 8, lines 3 and 7 of WO '214 mention the term "metal hydride". However, as defined on page 6, lines 5-13 of WO' 214, the term "metal hydride" in WO '214 means a metal or metal alloy which has a high hydrogen storage capacity, not a metal-hydrogen alloy.

This is confirmed in the working example on page 11, line 26 to page 12, line 10 of WO '214. This example clearly shows that only metals (Mg and FeTi) were subject to ball

milling. The ball milled metal powders are then compressed into a tablet. The tablet is then hydrogenated to form a metal-hydride hydrogen containing tablet. Thus, a hydrogenated metal is not subjected to grinding in WO '214.

In summary, claim 1 recites grinding a hydrogenated magnesium or magnesium compound. In contrast, WO '214 teaches to grind magnesium or a magnesium compound. The hydrogenation step in WO '214 occurs after the magnesium or a magnesium compound is ball milled and then compressed into a tablet.

II. The Prior Art Method Forms A Different Material

Page 2 of the Office Action apparently suggests that since Mg / $LaNi_5$ nanocrystalline composite (or Mg / FeTi) was known in the prior art (WO 97/24214), then it would have been obvious to one of ordinary skill in the art to try to produce MgH_2 / $LaNi_5$ nanocrystalline composite in order to have similar improved properties. There is no teaching, suggestion or motivation in WO '214 to make this modification.

WO '214 teaches a method to produce a composite of nanocrystalline structure where each of the individual components that are put together keep their original crystalline structure and their properties. Only the grain size or crystal size of the individual components are reduced to the nanometer size. In other words, in WO '214, the two components that are put together must keep their original crystalline structure and properties during the formation process of the composite.

Page 8, lines 21-25 of WO '214 states that the method of WO '214 is different from the method of a Liang et al. article published in J. Alloys and Compounds, in which the starting materials form an alloy with a different structure or properties. Specifically, Page 8, line 26 - page 9, line 13 of WO '214 describes the method of the Liang article, in which a Mg powder is ball milled intensively with an FeTi alloy and the two components react together to form an alloy of Mg, Fe and Ti (page 8, line 34). Interdiffusion occurs between these powders (page 9, line 2). The resulting product of the Liang article is in the form of nanocrystalline particles but not a mixture of separate particles of the original Mg and FeTi powders, as is obtained and required by the method of WO '214 (page 8, line 29-32). In the

method of WO '214, only a fine dispersion of nanocrystalline particles should be obtained, with no or very little modification of the physical characteristics of each material forming the composite (page 9, line 11 to line 13). This is the reason why the method of WO '214 prefers to simply press gently the two nanocrystalline components together to establish contact but not to alter each of the individual components.

In contrast, claim 1 of the present application requires hydrogenation of Mg or Mg compound. Thus, the starting powder forms a material with different properties from those of the starting powder. This difference is explained on page 14, lines 1 to 9 of the present specification. Specifically, the present specification states that in the case of MgH_2 / V nanocrystalline composites, the diffraction curves given in Fig. 13 show that, during grinding of a powder of MgH_2 with a powder of V, peaks of $VH_{0.81}$ are formed and a transfer is then achieved of part of the hydrogen stored in the MgH_2 into the vanadium. Moreover, the X-ray diffraction spectrum given in Fig. 13 shows that there is formation of a new metastable phase (γ-MgH_2) which has not been observed during the grinding of hydrogen storing materials and which could perhaps explain the exceptional performances of the claimed nanocrystalline composites for storing hydrogen.

Furthermore, page 15 line 4 to line 11 of the present specification states that in the case of MgH_2 / Nb, the results that were so obtained are very comparable with those reported for the nanocomposites containing V. Fig. 19 is a diffraction curve obtained with the ground product obtained for the absorption tests reported in Fig. 17 and 18. As can be noticed, this curve also shows that there has been a transfer of hydrogen form MgH_2 to Nb. The presence of a new metastable phase (γ - MgH_2) is also identified.

Still further, TABLE 1 on page 17 of the present application shows that the crystalline structures of the initial components that are being used to form the nanocrystalline composites area being modified during the formation process of the composite. This is totally different to what is being taught in WO '214.

One of ordinary skill in the art, knowing that WO '214 teaches that the components forming the nanocomposite should not be altered during the formation process, would have

been taught away from using (MgH_2) hydride as a starting component for producing the nanocrystalline composite. Compounds having dissimilar structures should not have similar properties. In view of the above, applicants respectfully request that the obviousness rejection over WO '214 be withdrawn.

III. Conclusion

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 3/30/06

By [signature]

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